

REMARKS/ARGUMENTS

In the Office Action mailed April 24, 2009, claims 7-12 and 14-25 were rejected. In response, Applicants hereby request reconsideration of the application in view of the amendments and the below-provided remarks.

For reference, claims 7 and 20 are amended. In particular, claim 7 is amended to recite “facing away from the bottom electrode” in order to clarify the language of the claim. Similarly, claim 20 is amended to recite “facing away from the first and second BAW resonators” to clarify the language of the claim. These amendments are supported by the subject matter described on page 4, lines 14-25, and illustrated in Fig. 1.

Claim Rejections under 35 U.S.C. 112, first paragraph

Claims 11, 12, 14, and 25 were rejected under 35 U.S.C. 112, first paragraph. Specifically, the Office Action states that the limitation “the absorbing layer” of claims 11, 12, 14, and 25 “has no support in the elected embodiment of new figure 1.”

However, 35 U.S.C. 112, first paragraph requires:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Applicants, therefore, submit that 35 U.S.C. 112, first paragraph, does not provide any basis for the present rejection because 35 U.S.C. 112, first paragraph, does not require that the subject matter of claims 11, 12, 14, and 25 have “support in the elected embodiment.”

Moreover, the subject matter of each of claims 11, 12, 14, and 25 qualifies as a sub-species of the embodiment shown in Fig. 1. Although the subject matter illustrated in Fig. 1 does not explicitly include an absorbing layer, there is no requirement that sub-species of the elected species cannot include additional features. Therefore, Applicants submit that the rejections of claims 11, 12, 14, and 25, under 35 U.S.C. 112, first

paragraph, are improper. Applicants respectfully request that the rejections of claims 11, 12, 14, and 25 under 35 U.S.C. 112, first paragraph, be withdrawn.

Claim Rejections under 35 U.S.C. 102 and 103

Claims 7, 8, 11, 12, 14, and 16 were rejected under 35 U.S.C. 102(e) as being anticipated by Nishihara et al. (U.S. Pat. No. 6,734,763, hereinafter Nishihara). Additionally, claims 7, 8, 11, 12, 14, 16-19, and 20-25 were rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara. Claims 9, 10, and 15 were rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara in view of Kobrin et al. (U.S. Pat. No. 5,936,150, hereinafter Kobrin). However, Applicants respectfully submit that these claims are patentable over Nishihara and Kobrin for the reasons provided below.

Independent Claim 7

As a preliminary matter, Applicants submit that the Office Action appears to be inconsistent in regard to the rejections of claim 7. In the Office Action, claim 7 was rejected under 35 U.S.C. 102(e) as being anticipated by Nishihara. Office Action, 4/24/09, page 3. However, the Office Action also rejects claim 7 under 35 U.S.C. 103(a) as unpatentable over Nishihara, with the recognition that Nishihara does not disclose all of the limitations of the claim. Office Action, 4/24/09, pages 4-5. It appears that these rejections of claim 7 under 35 U.S.C. 102(e) and 103(a) contradict each other. Therefore, it stands that one of the above rejections is improper. Applicants respectfully request that the Examiner address this inconsistency regarding the rejections of claim 7.

Applicants submit that claim 7 is patentable over Nishihara, whether considered alone or modified, because Nishihara does not disclose or teach all of the limitations of the claim. Claim 7 recites:

A bulk acoustic wave (BAW) resonator comprising:
a top electrode;
a piezoelectric layer disposed adjacent to the top electrode;
a bottom electrode disposed adjacent to the piezoelectric layer,
wherein the bottom electrode is disposed opposite the top electrode
relative to the piezoelectric layer; and
a substrate disposed opposite the piezoelectric layer relative to the
bottom electrode, wherein the substrate comprises an uneven surface to

suppress a spurious mode, wherein the uneven surface is on a rear side of the substrate facing away from the bottom electrode.
(Emphasis added.)

In contrast, Nishihara does not disclose or teach an uneven surface on a rear side of the substrate facing away from the bottom electrode. In particular, the Office Action acknowledges that Nishihara does not disclose a substrate which has an uneven surface on a rear side of the substrate. Office Action, 4/24/09, page 5. Nevertheless, the Examiner relies on the following description in Nishihara:

Unfavorably, the sacrifice layer, formed to have a thickness corresponding to the length L15, has a greater surface roughness than that of the silicon substrate 810. This deteriorates the orientation of the lower electrode 821 and the piezoelectric film 822 both of which are grown on the sacrifice layer via the SiO₂ film 840. As a result, it is difficult to obtain good resonance characteristics with the thin-film piezo-resonator.
Nishihara, col. 3, lines 4-11 (emphasis added).

However, although Nishihara indirectly mentions a surface roughness of a silicon substrate relative to the surface roughness of the sacrifice layer described in reference to Fig. 21, Nishihara does not state which surface of the substrate might have the surface roughness. In fact, from the context of the description, it appears that Nishihara implicitly refers to the top surface of the substrate on which the sacrifice layer is disposed to form the cavity, because Nishihara compares the surface roughness of the sacrifice layer to that of the substrate on which the sacrifice layer is disposed. There appears to be no correlation between the surface roughness of the sacrifice layer and the bottom surface of the substrate (i.e., the bottom surface in Fig. 21). Hence, the description in Nishihara is insufficient to disclose or teach an uneven surface on a rear side of the substrate facing away from the bottom electrode.

Additionally, as motivation to support the conclusion of obviousness, the Examiner asserts:

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a substrate with an uneven surface, wherein the uneven surface is on a rear side of the substrate opposite the bottom electrode in Nishihara et al.'s device in order to form the device as

understood by Nishihara et al.'s teachings, and in order to simplify the processing steps of making the device (by having the uneven surface on a rear side of the substrate), respectively.
Office Action, 04/24/2009, pages 5-6 (emphasis added).

However, Applicants assert that the reasons cited by the Examiner to support the purported conclusion of obviousness is insufficient. First, the suggestion that it would be obvious to modify Nishihara to include an uneven surface "in order to form the device as understood by Nishihara et al." is unclear and further gives no rational underpinning to support the asserted conclusion of obviousness. Applicants submit that if the device of Nishihara were modified, the reason to modify the device cannot come from the device itself, because the device described in Nishihara is not modified in the manner suggested by the Examiner. Hence, the described process to form the unmodified device cannot logically be the basis for suggesting a modification to the device. Moreover, the device described in Nishihara would not need to be modified in order to form the device as it is already described. Therefore, the assertion that it purportedly would have been obvious to modify the substrate with an uneven surface on a rear side of the substrate to form the device of Nishihara, which is not described with such a surface, cannot be considered a rational underpinning simply because the argument is not logical.

Second, because Nishihara does not teach an uneven surface on a rear side of the substrate, Nishihara does not describe processing steps to creating an uneven surface on a rear side of the substrate. Therefore, in order to implement the modification suggested by the Examiner, the description of Nishihara would have to be augmented to include an additional process step to make the surface uneven on a rear side of the substrate. Adding an additional process step to the description of Nishihara in order to implement the modification, as suggested by the Examiner, would not "simplify the processing steps of making the device," but rather would make the processing steps more complex by adding additional processing steps. Therefore, the assertion that it purportedly would have been obvious to modify the substrate with an uneven surface on a rear side of the substrate to simplify the processing steps described in Nishihara cannot be considered a rational underpinning because the additional processing steps would make the processing more complex.

For the reasons presented above, Nishihara does not disclose or teach all of the limitations of the claim. In particular, Nishihara does not disclose or teach an uneven surface of the substrate facing away from the bottom electrode. Additionally, the rejection of claim 7 is improper because the Office Action does not provide a rational underpinning to support the conclusion of obviousness. Accordingly, Applicants respectfully assert claim 7 is patentable over Nishihara because Nishihara does not disclose or teach all of the limitations of the claim and because the rejection of claim 7 is improper.

Independent Claims 20

Applicant respectfully asserts independent claim 20 is patentable over the cited reference at least for similar reasons to those stated above in regard to the rejection of independent claim 1. The claim recites subject matter which is similar to the subject matter of claim 1 discussed above. Although the language of the claim differs from the language of claim 1, and the scope of the claim should be interpreted independently of other claims, Applicant respectfully asserts that the remarks provided above in regard to the rejection of claim 1 also apply to the rejection of claim 20.

Dependent Claims

Claims 8-10, 12-19, and 21-26 depend from and incorporate all of the limitations of the corresponding independent claims 7 and 20. Applicants respectfully assert claims 8-10, 12-19, and 21-26 are allowable based on allowable base claims. Additionally, each of claims 8-10, 12-19, and 21-26 may be allowable for further reason.

CONCLUSION

Applicants respectfully request reconsideration of the claims in view of the amendments and the remarks made herein. A notice of allowance is earnestly solicited.

At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account **50-4019** pursuant to 37 C.F.R. 1.25. Additionally, please charge any fees to Deposit Account **50-4019** under 37 C.F.R. 1.16, 1.17, 1.19, 1.20 and 1.21.

Respectfully submitted,

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